

U.S.S.N. 10/789,150
Group Art Unit: 3616
Examiner: George D. Spisich

IN THE DRAWINGS

With the approval of the Examiner, please replace Fig. 8 of the original drawings with the attached amended new sheet of drawing for Fig. 8.

REMARKS

The Abstract has been replaced by a new Abstract believed to provide a more concise summary of the disclosure in accordance with the required format.

Fig. 8 of the drawings has been amended in the manner required by the Examiner, wherein it is now designated as "Prior Art."

The specification has been amended to correct all noted informalities, including those pointed out by the Examiner in the Office Action. Due to the numerous amendments required, a new substitute specification was prepared and is being submitted herewith. The marked-up copy of the original specification utilized by the undersigned in the preparation of the new specification, wherein deletions and additions have been indicated in accordance with the requirements of 37 CFR 1.125 are provided. The new specification corresponds exactly to the marked-up copy and is fully supported by the original disclosure of this application. The new specification does not introduce any new matter into this case. With the approval of the Examiner, please substitute the new specification for the specification originally filed in this application.

The Examiner rejected original claims 1-7 under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner will note these claims have all been extensively amended to overcome all noted informalities, including those pointed out by the Examiner in the Office Action, and to place same in full compliance with 35 USC 112, second paragraph. Applicant acknowledges with appreciation the indication by the Examiner that these claims would be deemed allowable upon overcoming this rejection.

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In view of the foregoing, this application should now be in condition for formal allowance and a prompt notice this affect is respectfully requested.

If the Examiner should have any questions concerning this matter, the undersigned may be reached at his Alexandria, Virginia office at (703) 683-0500.

Respectfully submitted,



Eugene Mar
Registration No. 25,893

CUSTOMER NUMBER 23364
BACON & THOMAS
625 Slaters Lane - 4th Floor
Alexandria, VA 22314
(703) 683-0500

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Background of the invention

(1) Field of the invention

This invention relates to a self-leveling and balancing vehicle, especially
a vehicle which can be kept ^{in a} on the level and ^{balanced} position when it is moving
5 on a slope or uneven road.

(2) Description of the Prior Art

To ^{move along} run on a slope is a common thing for various vehicles, however, such
^{but a vehicle} vehicles will decline when ^{it travels on a} they run on the slope. Accordingly, ^{when a vehicle is} once the vehicles
run on a slope, the people or objects in the ^{vehicle} vehicles may fall down or collide with
10 each other, ^{and} even the ^{vehicles} vehicles may ^{to} turn over ^{or} to cause accidents. ^{With reference to} [Reference to the]
China Patent No. 99116012.6, ^{permitting} a leveling device for vehicles ^{this is disclosed} has been researched
and developed ^{to solve} to solve the above problems, ^{has} the leveling device for vehicles
(such as shown in Fig.8) ^{has} having a base A and a driving system B, two sides of
the base having respectively a sector gear A1, the sector gears being engaged
15 respectively with the driving gears B1 of the driving system B installed on a seat
C of the vehicle, thus the seat C can be kept on the level position when it is
running on a slope by adjusting the angle between the driving gears B1 and the
sector gears A1. However, ^{this} [such] leveling device ^{can} only ^{can} keep the seat of ^{the} vehicle
^{in a} on the level position but ^{cannot} keep the vehicle ⁱⁿ on balance. Accordingly, the
20 vehicle with such leveling device still may turn over on a steep slope beyond 40
degree because it ^{cannot} keep one's ^{maintain} balance, ^{and} further, the driving gears B1 and the
sector gears A1 ^{cannot} be engaged with each other ^{firmly} [firmly].
^{cannot} ^{firmly}

Summary of the invention

It is therefore the main object of this invention to provide a self-leveling

and balancing vehicle which can be kept ^{in a} ~~on the~~ level and balance position when it is running on a steep slope to prevent the people or objects ⁱⁿ ~~on~~ the vehicle from falling down or colliding with each other.

The ~~above~~ vehicle is composed of a base and a moving and driving mechanism installed on the base, the moving and driving mechanism having two longitudinal moving seats, a connecting frame extending to connect the longitudinal moving seats and two sector gears installed on the two longitudinal seats, respectively, a driving motor and a level sensor being installed on the connecting frame, the driving shaft of the driving motor extending to the sector ^{ends} ~~ends~~ gears, ^{further} two level driving gears being installed on two ^{ends} ~~end~~ of the driving shaft and engaged with the two sector gears, a balance driving gear box being installed on the driving shaft and having an output shaft extending to the connecting frame ^{which} ~~and~~ can be rotated freely, ^{and} ~~further~~ two driven gears being installed on two ends of the output shaft []] ~~]~~.

^{The} ~~the~~ ^{includes} ~~having~~ two guiding rails ^{in parallel} ~~paralleled~~ with ^{the} ~~moving~~ direction of the vehicle, the longitudinal moving seats ^{being} ~~can be~~ mounted on the two guiding rails ^{in parallel} ~~paralleled~~ with the two guiding rails, ^{and} ~~further~~ two racks being fixed between and ^{and} ~~paralleled~~ with the two guiding rails, the driven gears on the output shaft being engaged with the two racks []] ~~]~~.

^{when} ~~once~~ ^{is} ~~the~~ vehicle running up or down a slope, the level sensor can start the driving motor ^{to} ~~to~~ automatically ^{and cause} ~~to~~ drive the driving shaft ^{to rotate} ~~to~~ make the level driving gears ^{and} ~~can be rotated~~ along the sector gears ^{and} ~~to~~ adjust the chair or platform on the connecting frame to ^a ~~level~~ position, ^{and} ~~meanwhile~~, the two driven gears installed on the output shaft can be rotated reversely with the driving shaft and moved

forward or backward along the racks to make the moving and driving mechanism
move simultaneously along the guiding rails to ^a balance position.
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Brief description of the drawings

In the drawings, which illustrate the preferred embodiments and modes of
5 operation of the invention, and in which like reference characters designate the
same or similar parts throughout the several views:

Fig.1 is a plan view showing the longitudinal moving mechanism of a
self-leveling and balancing vehicle of this invention;

Fig.2 is a sectional view of the wheel chair on line A-A in Fig.1;

10 Fig.3 is a plan view showing the self-leveling and balancing vehicle of
this invention;

Fig.4 is a left side elevational view of this invention;

Fig.5 is a plan view showing the status of the self-leveling and balancing
vehicle running on a slope;

15 Fig.6 is a plan view showing another embodiment of this invention;

Fig.7 is a plan view showing still another embodiment of this invention;
and

Fig.8 is an exploded view showing a conventional wheel chair with a
leveling device.

20 Detailed description of the preferred embodiments

Referring to Fig.1 to Fig.4, the present invention, a self-leveling and
balancing vehicle, is composed of a moving and driving mechanism 1 and a base
2, wherein the moving and driving mechanism 1 ^{is} ~~are~~ installed on the base 2.
The moving and driving mechanism 1 ^{has} ~~have~~ two longitudinal moving seats 11
^

formed at its two ^{respective} sides ^{and connecting} [respectively] a connecting frame 12 extending to [connect] ^{is} the longitudinal moving seats 11 and two sector gears 13 installed on the two longitudinal seats 11 [respectively] [There is a] ^A driving motor 145 ^{is} fixed under the top of the connecting frame 12 ^{with} the driving motor 145 have a ^{and has} driving shaft 14 extending to the sector gears 13, ^{is} two ends of the driving shaft 14 being equipped with two level driving gears 141 which can be engaged firmly with the inward teeth of the two sector gears 13. [There is a] ^A balance driving gear box 142 ^{is} installed on the driving shaft 14 and between the two sector gears 13, ^{and an} [the] output shaft 143 of the balance driving gear box ^{is} [being] located at the connecting frame 12 ^{and can} ~~for free rotation and provided with~~ ^{be rotated freely, further,} two last driven gears 1421, 1431 ~~being installed on the~~ ^{output shaft 143.}

Referring to Fig.2, [there are] ^{are} two guiding rails 112 ^{respectively} installed on two sides of the base 2, the sliding grooves 111 of the two longitudinal seats 11 being ^{The} fitted on the guiding rails 112 [respectively, however, the] fitting between the sliding groove and the guiding rail can be a dove-tail joint or other ^{kind} [kinds] of joint. Two racks 21 are installed on two supporting posts 211 which are fixed on the base 2 and between the two guiding rails 112, the two racks 21 being parallel with ^{the} ~~or longitudinal axis~~ moving direction of the wheel chair ^{The} [further, the] driven gears 1421, 1431 on the output shaft 143 of the balance driving gear box 142 being engaged [respectively] ^{permit} with the two racks 21 to [make] the moving and driving mechanism 1 ^{to} [can] be moved on the base 2.

The balance driving gear box 142 is composed of a case 1422 ^{an} and even number of engaged gears, such as two or four gears ^{In} [in] this embodiment, the balance driving gear box 142 ^{has} [having] four gears. The driving gear 144 in the

balance driving gear box 142 is installed on the driving shaft 14 and the driven gear 1421 is installed on the output shaft 143, ^{with} [further,] the driven gear 1421 being rotated reversely with the driving gear 144 by means of ^{intermediate} the two ^(not shown) medium gears.

The connecting frame 12 ^{has} [have] a level sensor herein ^(not shown in figures) ^{for detecting} whether the vehicle is ^{is in a} on the level position ^{. If} [if not,] the level sensor can start the driving motor 145 to drive the level driving gears 141 and the balance driving gear box 142 to adjust the vehicle to level and balance position. Two sides of the connecting frame 12 ^{each} are formed into ^a triangular supporting shape 121, the lower part of ^{each side} two sides of the connecting frame 12 ^{with} having a first locating hole 1211 [respectively] two ends of the output shaft 143 of the balance driving gear box 142 ^{being} [can be] installed in the first locating holes 1211 ^{for free rotation} (and rotated freely, further, the ^{The} upper part of ^{each side} two sides of the connecting frame 12 ^{each} having a second locating hole 1212 [respectively] aligned with the first locating ^{holes} [hole] 1211, ^{and} two ends of the driving shaft 14 of the driving motor 145 ^{for free rotation} [can be] ^{are} installed in the second holes 1212 [and rotated freely] The top of the connecting frame 12 can be equipped with a chair or [carry] platform for carrying people or cargo [other cargoes].

The base 2 is composed of a top plate 22, a bottom plate 23 and three supporting posts 24 installed between the top plate 22 and the bottom plate 23. ^{The} top end of each supporting post 24 ^{is} [being] pivoted on the top plate 22 and the ^{of each post 24 is} bottom end ^{being} [fixed] on the bottom plate 23, further, ^a a compression spring ^{is} [being] installed on the supporting post 24 for absorbing ^{vibrations created by a} [the vibration on the] rough road. ^{Two} (There are two) ^{are} idler wheels 25 ^{adjacent} installed [near to] the bottom center of the base 2, ⁱⁿ [in] each idler wheel having a compression spring ^(not shown in figures) [for] ^{with}

supporting the vehicle when it is climbing up the steps.

Referring to Fig.1 and Fig.5, the level sensor can detect automatically when the vehicle is not in a level position when the vehicle is running up a slope, so meanwhile the level sensor can start the driving motor 145 to rotate the driving shaft 14 clockwise, and thus the level driving gears 141 can rotate counterclockwise along the sector gears 13 to adjust the chair or carry platform on the connecting frame 12 to a level position, further, The driving gear 144 in the balance driving gear box 142 drives the driven gears 1421, 1431 to rotate counterclockwise more and move forward along the racks 21, such that the moving and driving mechanism 1 can be moved forward along the guiding rails 121 to a balance position. On the other hand, the driving motor 145 also drive the driving shaft 14 to rotate counterclockwise so as to adjust the chair or carry platform on the moving and driving mechanism 1 to a level and balance position when the vehicle is running down a slope.

15 Accordingly, the present invention provide a self-leveling and balancing wherein when the vehicle is running up or down a slope, the chair or platform on the moving and driving mechanism can be automatically rotated and moved to a level and balance position automatically so as to prevent the people or other cargos on the vehicle from falling down or colliding with each other.

20 The Fig.6 shows another embodiment of this invention, wherein the chair installed on the moving and driving mechanism 1 can be replaced with a carry platform for carrying people or other cargo cargoes. The Fig.7 shows still another embodiment of this invention, wherein the wheels of vehicle can be replaced with a caterpillar tread, further the two idler wheels 5 being installed near to the inner top center of the with adjacent

base 2, ^{and}
[in] each idler wheel having a compression spring 251 for supporting the
vehicle when it is climbing up [the] steps.

It is understood by those skilled in the art that the foregoing description is
a preferred device and that various changes and modifications may be made in
5 the invention without departing the spirit and scope thereof.